In the Claims

1. (canceled) A process for anisotropically dry etching a compound semiconductor heterostructure, said process comprising:

selectively masking a surface of the heterostructure; and
exposing the masked heterostructure to a plasma comprising a mixture
of hydrogen bromide and nitrogen to anisotropically etch the unmasked
portion of the heterostructure in a direction generally perpendicular to the
major surface.

- 2. (canceled) The process of claim 1 further comprising maintaining the semiconductor heterostructure at a temperature above 160°C.
- 3. (canceled) The process of claim 1 wherein the semiconductor heterostructure contains Indium.
- 4. (canceled) The process of claim 1 wherein the semiconductor heterostructure includes at least one of InP, InGaAs and InGaAsP.

- 5. (canceled) The process of claim 1 further comprising the step of performing the process with an inductively coupled plasma etching system.
- 6. (canceled) The process of claim 1 wherein the etching is performed at a rate of at least 2 µm/minute.
- 7. (canceled) The process in claim 1 further comprising the step of maintaining a pressure of approximately 5 mtorr during etching of the heterostructure.
- 8. (currently amended) A method of etching a substantially vertical feature in a semiconductor substrate in a vacuum chamber, said method comprising:

depositing a mask on the semiconductor substrate;

maintaining the temperature of the semiconductor substrate in the vacuum chamber above approximately 160°C;

introducing a nitrogen containing gas and a hydrogen bromide

containing gas into said vacuum chamber, said nitrogen containing gas

having a volumetric flow rate that is less than said hydrogen bromide

containing gas;

igniting a plasma in the vacuum chamber;

forming a nitrogen containing layer on the semiconductor substrate from a <u>said</u> nitrogen containing gas; and

etching the semiconductor substrate with a said hydrogen bromide containing gas.

- 9. (original) The method of claim 8 wherein the semiconductor substrate further comprises Indium.
- 10. (original) The method of claim 8 wherein the semiconductor substrate further comprises at least one of InP, InGaAs and InGaAsP.
- 11. (original) The method of claim 8 further comprising the step of performing the etching step with a high density plasma source.
- 12. (original) The method of claim 11 further comprising the step of performing the etching step with an inductively coupled plasma source.
- 13. (original) The method of claim 8 wherein the etching is performed at a rate of at least 2 µm/minute.

- 14. (original) The method of claim 8 further comprising the step of maintaining a pressure in the vacuum chamber of approximately 5 mtorr.
- 15. (withdrawn) A device for etching a feature in a semiconductor substrate wherein said feature is substantially perpendicular to the surface of the semiconductor substrate, said device comprising

a heater for maintaining the temperature of the semiconductor substrate at a temperature above approximately 160°C; and

a gas supply for providing a mixture of hydrogen bromide and nitrogen for use in etching the semiconductor substrate.

- 16. (withdrawn) The device of claim 15 further comprising an inductively coupled plasma source.
- 17. (withdrawn) The device of claim 15 wherein the semiconductor substrate contains at least some Indium.
- 18. (withdrawn) The device of claim 15 wherein the semiconductor substrate further comprises at least one of InP, InGaAs and InGaAsP.

- 19. (withdrawn) The device of claim 15 further comprising etching means for etching the semiconductor substrate at a rate of at least 2 μ m/minute.
- 20. (withdrawn) The device of claim 15 further comprising a pressure regulator for maintaining a pressure of approximately 5 mtorr during the etching of the semiconductor substrate.